Facility Facts & Figures

The National Synchrotron Light Source (NSLS) is a national user research facility funded by the U.S. Department of Energy's Office of Basic Energy Science. The NSLS operates two electron storage rings: an x-ray ring (2.8 GeV, 280 mA) and a vacuum ultraviolet (VUV) ring (800 meV, 1.0 A), which provide intense light spanning the electromagnet spectrum from the infrared through x-rays. The properties of this light, and the specially designed experimental stations, called beamlines, allow scientists in many fields of research to perform experiments not otherwise possible at their own laboratories.

Over 2,200 scientists representing more than 400 institutions, more than 60 of them corporations, come to Brookhaven National Laboratory annually to conduct research at the NSLS. The facility operates seven days a week, 24 hours a day throughout the year, except during periods of maintenance and studies.

As a national user facility, the NSLS does not charge for its beamtime, providing that the research results are published in the open literature. Proprietary research is conducted on a full cost recovery basis. The primary way to obtain beamtime at the NSLS is through the General User program. General Users are independent investigators interested in using the NSLS for their research. Access is gained through a peer-reviewed proposal system.

The NSLS currently has 53 x-ray and 13 VUV-IR operational beamlines available to users for performing a wide range of experiments. There are two types of beamlines at the NSLS: Facility Beamlines (FBs) and Participating Research Team (PRT) beamlines. In 2005, the NSLS had 19 FBs and 47 PRT beamlines. FBs are operated by the NSLS and reserve at least 50% of their beamtime for General Users. Some FBs host contributing users (CUs), who enhance the endstation capabilities and provide specialized user support on FBs. PRT beamlines are operated by user groups with related interests from one or more institutions. PRT beamlines reserve 25% of their beamtime for General Users. Membership in a PRT or CU program is open to all members of the scientific community who can contribute significantly to the program of the beamline, (i.e., funding, contribution of equipment, scientific program, design and engineering, operations manpower, etc).

The following pages list the operational beamlines at the NSLS and their unique characteristics.

Beamline Guide Abbreviations

Technique	Description
ARPES	UV photoelectron spectroscopy, angle-resolved
DAFS	X-ray diffraction anomalous fine structure
DEI	Diffraction-enhanced imaging
EXAFS	X-ray absorption spectroscopy, extended fine structure
GISAXS	Grazing incidence small angle x-ray scattering
IRMS	Infrared microspectroscopy
MAD	Multi-Wavelength anomolous dispersion
MCD	Magnetic circular dichroism
NEXAFS	Near edge x-ray absorption spectroscopy
PEEM	Photo emission electron microscopy
SAXS	Small angle x-ray scattering
SPARPES	UV photoelectron spectroscopy, spin- and angle-resolved
STXM	Scanning transmission x-ray microscopy
UPS	UV photoelectron spectroscopy
UV-CD	Ultraviolet circular dichroism
WAXD	Wide-angle x-ray diffraction
WAXS	Wide-angle x-ray scattering
XAFS	X-ray absorption spectroscopy, fine structure
XANES	X-ray absorption spectroscopy, near edge structure
XAS	X-ray absorption spectroscopy
XPS	X-ray photoelectron spectroscopy
XRD	X-ray diffraction
XSW	X-ray standing waves

VUV-IR Beamlines

Beamline	Source	Technique	Energy Range	Type	Organization
U1A	Bend	XAS XAFS NEXAFS XANES	270-900 eV	PRT	ExxonMobil Research and Engineering Co.
U2A	Bend	IRMS High pressure research IR spectroscopy	30-8000 cm-1	FB	BNL-NSLS Carnegie Institution of Washington COMPRES
U2B	Bend	IRMS IR spectroscopy	50-4000 cm-1	PRT	Case Western Reserve University
U3C	Bend	Metrology	50-1000 eV	PRT	Bechtel Nevada Lawrence Livermore National Laboratory Los Alamos National Laboratory Sandia National Laboratory
U4A	Bend	UPS	10-250 eV	PRT	Army Research Laboratory North Carolina State University Rutgers University University of North Carolina
U4B	Bend	X-ray scattering, resonant MCD UPS X-ray fluorescence spectroscopy XPS	20-1200 eV	PRT	Montana State University Northeastern University
U5UA	Insertion Device	ARPES UPS, spin-resolved PEEM	15-150 eV	FB	BNL-NSLS BNL-CFN
U7A	Bend	NEXAFS XANES XPS	180-1200 eV	PRT	BNL-Chemistry Dow Chemical Company NIST University of Michigan
U9B	Bend	UV-CD UV florescence spectroscopy	0.8 - 8.0 eV	PRT	BNL-Biology
U10A	Bend	IRMS	100-4000 cm-1	FB	BNL-NSLS

Beamline	Source	Technique	Energy Range	Type	Organization
U10B	Bend	IRMS	500-4000 cm-1	FB	BNL-NSLS
U11	Bend	UV-CD	3-10 eV	PRT	BNL-Biology
U12A	Bend	XAS XPS	100-800 eV	PRT	Oak Ridge National Laboratory
U12IR	Bend	IR spectroscopy THz / mm wave spectroscopy Time-resolved spectroscopy	6-600 cm-1	FB	BNL-NSLS
U13UB	Insertion Device	UPS ARPES	3-30 eV	PRT	Boston College Boston University BNL-Physics Columbia University

X-ray Beamlines

X1A1	Insertion Device	STXM	0.25-0.50 keV	PRT	BNL-Environmental Science ExxonMobil Research and Engineering Co. SUNY @ Plattsburgh Stony Brook University University of Texas @ Houston
X1A2	Insertion Device	STXM	0.25-1 keV	PRT	Stony Brook University
X1B	Insertion Device	X-ray scattering, coherent XAS X-ray fluorescence spectroscopy XPS	0.2-1.6 keV	PRT	Boston University TJNL University of Illinois
X2B	Bend	X-ray microtomography	8-35 keV	PRT	ExxonMobil Research and Engineering Co.
X4A	Bend	MAD Macromolecular crystallography	3.5-20 keV	PRT	Albert Einstein College of Medicine City University of New York (CUNY) Columbia University Cornell University Mount Sinai School of Medicine New York Structural Biology Center New York University SUNY @ Buffalo Sloan-Kettering Institute Wadsworth Center

Beamline	Source	Technique	Energy Range	Type	Organization
X4C	Bend	MAD Macromolecular crystallography	7-20 keV	PRT	Albert Einstein College of Medicine City University of New York (CUNY) Columbia University Cornell University Mount Sinai School of Medicine New York Structural Biology Center New York University Rockefeller University SUNY @ Buffalo Sloan-Kettering Institute Wadsworth Center
X5A	Bend	Laser backscattering	150-420 MeV	PRT	BNL-Physics Forschungszentrum Juelich (KFA) James Madison University Norfolk State University Ohio University University of Rome II University of South Carolina University of Virginia Virginia Polytechnic Institute
X6A	Bend	MAD Macromolecular crystallography	6.0-23 keV	FB	BNL-NSLS National Institutes of Health
X6B	Bend	XRD, surface WAXD X-ray reflectivity SAXS GISAXS	7-19 keV	FB	BNL-NSLS
X7B	Bend	XRD, single crystal XRD, time resolved WAXD WAXS	5-21 keV	PRT	BNL-Chemistry General Electric
X8A	Bend	Metrology	1.0-5.9 keV	PRT	Bechtel Nevada Lawrence Livermore National Laboratory Los Alamos National Laboratory Sandia National Laboratory
X8C	Bend	MAD Macromolecular crystallography	5-19 keV	PRT	Biogen Incorporated BNL-Biology Hoffmann-La Roche National Research Council of Canada
X9A	Bend	MAD Macromolecular crystallography	5-15 keV	PRT	Albert Einstein College of Medicine Case Western Reserve University Rockefeller University Sloan-Kettering Institute

Beamline	Source	Technique	Energy Range	Type	Organization
X9B	Bend	XAS EXAFS XAFS NEXAFS XANES	5-15 keV	PRT	Case Western Reserve University
X10A	Bend	XRD, powder XRD, time resolved WAXD X-ray reflectivity SAXS WAXS	6-15.2 keV	PRT	ExxonMobil Research and Engineering Co.
X10B	Bend	XRD, powder XRD, surface WAXD X-ray reflectivity X-ray scattering, surface WAXS	14 keV	PRT	ExxonMobil Research and Engineering Co.
X10C	Bend	XAS EXAFS XAFS NEXAFS XANES	4-24 keV	PRT	ExxonMobil Research and Engineering Co.
X11A	Bend	DAFS XAS EXAFS XAFS NEXAFS XANES	4.5-35 keV	PRT	BNL-Environmental Science BNL-Material Sciences Canadian Light Source ETH Labs - Zuerich Naval Research Laboratory (NRL) Naval Surface Warfare Center New Jersey Institute of Technology Sarah Lawrence College Stony Brook University
X11B	Bend	DAFS XAS EXAFS XAFS NEXAFS XANES	5.0-23 keV	PRT	BNL-Environmental Science BNL-Material Sciences Canadian Light Source ETH Labs - Zuerich Naval Research Laboratory (NRL) Naval Surface Warfare Center New Jersey Institute of Technology Sarah Lawrence College Stony Brook University
X12B	Bend	MAD Macromolecular crystallography	5-20 keV	PRT	BNL-Biology

Beamline	Source	Technique	Energy Range	Type	Organization
X12C	Bend	MAD Macromolecular crystallography	5.5-20.0 keV	PRT	BNL-Biology
X13A	Insertion Device	X-ray scattering, resonant MCD	0.2-1.6 keV	FB	BNL-NSLS
X13B	Insertion Device	Microdiffraction Imaging	4-16 KeV	FB	BNL-NSLS
X14A	Bend	MAD XRD, powder XRD, single crystal XRD, time resolved WAXD X-ray reflectivity	5-26 keV	PRT	Oak Ridge National Laboratory Tennessee Technological University University of Tennessee
X15A	Bend	XSW DEI	3-25 keV XSW 10-60 keV DEI	FB	BNL-NSLS Northwestern University
X15B	Bend	XAS EXAFS XAFS NEXAFS XANES	0.8-15 keV	PRT	BNL-Environmental Sciences Lucent Technologies, Inc. Stony Brook University Temple University University of Texas @ Austin
X16C	Bend	XRD, powder	6-30 keV	PRT	Stony Brook University
X17B1	Insertion Device	XRD, powder	55-80 keV mono 20-150 keV white	FB	BNL-NSLS Rutgers University
X17B2	Insertion Device	XRD, powder XRD, time resolved High pressure research	20-130 keV	FB	BNL-NSLS COMPRES Stony Brook University
X17B3	Insertion Device	XRD, powder XRD, single crystal High pressure research	5-80 keV	FB	BNL-NSLS COMPRES University of Chicago
X17C	Insertion Device	XRD, powder XRD, single crystal High pressure research	5-80 keV	FB	BNL-NSLS University of Chicago

Beamline	Source	Technique	Energy Range	Type	Organization
X18A	Bend	XRD, powder XRD, single crystal XRD, surface WAXD X-ray reflectivity X-ray scattering, surface WAXS	4-19 keV	PRT	BNL-Chemistry Indiana University @ Indianapolis Pennsylvania State University Purdue University Stony Brook University University of Missouri @ Columbia
X18B	Bend	XAS EXAFS XAFS NEXAFS XANES	4.8-40 keV	FB	BNL-NSLS BNL-Chemistry BNL-Electrochemistry ORNL UOP LLC University of Delaware Yeshiva University
X19A	Bend	X-ray scattering, resonant XAS EXAFS XAFS NEXAFS XANES	2.1-17 keV	FB	BNL-NSLS University of Delaware Yeshiva University
X19C	Bend	XRD, surface X-ray topography X-ray reflectivity X-ray scattering, liquid X-ray scattering, surface	6-17 keV	PRT	Arizona State University Fairfield Crystal Technology, LLC Kansas State University Kyushu University SUNY @ Albany Stony Brook University University of Illinois @ Chicago
X20A	Bend	XRD, single crystal Microdiffraction Imaging X-ray reflectivity X-ray scattering, surface	4.5-13 keV	PRT	IBM Research Division
X20C	Bend	XRD, single crystal XRD, surface XRD, time resolved X-ray reflectivity X-ray scattering, surface	4-11 keV	PRT	IBM Research Division
X21	Insertion Device	XRD, single crystal X-ray scattering, magnetic X-ray scattering, resonant SAXS	5-20 keV	FB	BNL-NSLS Boston University University of Vermont

Beamline	Source	Technique	Energy Range	Type	Organization
X22A	Bend	XRD, single crystal XRD, surface WAXD X-ray reflectivity X-ray scattering, surface WAXS	10.7 keV 32keV	PRT	BNL-X-Ray Scattering Group BNL-Chemistry
X22B	Bend	X-ray scattering, liquid X-ray scattering, surface	6.5-10 keV	PRT	Bar-Ilan University BNL-X-Ray Scattering Group BNL-CFN Harvard University
X22C	Bend	XRD, single crystal XRD, surface X-ray reflectivity X-ray scattering, magnetic X-ray scattering, surface	3-12 keV	PRT	BNL-X-Ray Scattering Group Massachusetts Institute of Technology Rutgers University
X23A2	Bend	XRD, powder DAFS XAS EXAFS XAFS NEXAFS XANES	4.7-30 keV	PRT	NIST
X23B	Bend	XRD, powder XAS EXAFS XAFS NEXAFS XANES	4-10.5 keV	PRT	Hunter College Montana State University Naval Research Laboratory (NRL) New Jersey Institute of Technology Sarah Lawrence College
X24A	Bend	XSW Auger spectroscopy EXAFS X-ray fluorescence spectroscopy XPS	1.8-5 keV	PRT	NIST
X24C	Bend	X-ray reflectivity UV photoabsorption spectroscopy UPS XAS	0.006-1.8 keV	PRT	Naval Research Laboratory (NRL)
X25	Insertion Device	MAD Macromolecular crystallography	3-28 keV	FB	BNL-NSLS BNL-Biology

Beamline	Source	Technique	Energy Range	Type	Organization
X26A	Bend	Microdiffraction Imaging X-ray microprobe	3-30 keV	PRT	BNL-Environmental Science University of Chicago University of Georgia
X26C	Bend	MAD Macromolecular crystallography	5-20 keV	PRT	BNL-Biology Cold Spring Harbor Laboratory Stony Brook University
X27A	Bend	X-ray microprobe	4.5-20 keV	FB	BNL-NSLS BNL-Environmental Science Stony Brook University
X27C	Bend	XRD, time resolved WAXD SAXS WAXS	9 keV	PRT	Air Force Research Laboratory National Institutes of Health Naval Surface Warfare Center Stony Brook University
X28C	Bend	X-ray footprinting	White Beam	PRT	Case Western Reserve University
X29A	Insertion Device	MAD Macromolecular crystallography	6-15keV	PRT	Case Western Reserve University BNL-Biology